

**FY 2011/2012 QC Category No. 10A  
STATEWIDE INSPECTION GUIDELIST  
Bridge Structures - General Concrete**

***FORMING***

1. The ground below pile and drilled shaft footings must be prepared and compacted properly, prior to form setting. [Spec. 455-1]
2. Form material must be approved and must have the proper dimensions, chamfers, positioning, bracing, friction collars, release agent, and be free of dirt or any other debris. Engineer must approve forms, including Stay-In-Place (SIP), prior to concrete placement. Check for coating defects on all surfaces of polymer coated SIP form elements prior to their installation. [Spec. 400-5]
3. Traffic barrier removable form alignment is particularly critical since public visibility of barriers is very high. [Spec. 400-5]
4. Slip formed traffic barrier concerns: guide string alignment, adequate slip forming machine operation and vibrators, clean deck surface, and rebar cover adjustments made just before the slip former passes. [Spec. 521-4 and Good Practice]
5. Falsework should be reviewed by the Project Administrator prior to any concrete placements. [Spec. 5-1, 400-4, and Good Practice]

***PLACING AND TYING REBARS***

6. Storing, placing, and tying rebar must be done properly. [Spec. 415-3 thru 5]
7. Rebar placing, tying and support concerns: placement tolerances, securing and lapping of splices, mortar block composition and fastening, in extremely aggressive environments, use of metal chairs or bolsters in contact with forms is not permitted and continuous rails of bolsters are not permitted to be in direct contact with forms. [Spec. 415-5]
8. Footing rebars: use double strand single tie at all perimeter intersections and at alternating interior intersections. [Spec. 415-5]
9. Column hoops shall be tied to the vertical bars at every intersection by a cross or figure 8 tie. [Spec. 415-5]
10. Wall rebars shall be tied with a cross or figure 8 tie at all perimeter intersections and at a minimum, every third interior intersection. [Spec. 415-5]
11. Beam and cap rebars: heavy beam bolsters must be used for bottom and top mats of rebars and spacing and positioning is critical. Tying shall be double strand single ties at all intersections. [Spec. 415-5]

12. Traffic barrier rebars must be free of hardened concrete, curing compound and other foreign matter; utility conduits and embedments separated from rebar, and utility conduit slip joints and junction boxes properly installed. [Spec. 415-3 and Good Practice]

### ***PLACING CONCRETE***

13. Monitor surface moisture evaporation rate during placement and do not exceed 0.1 lb/ft<sup>2</sup>/hr unless countermeasures are employed. [Spec. 400-16]
14. There are temperature restrictions for mixing and placing concrete when very hot or very cold, requirements for keeping concrete warm when cold and for retarding when hot, and for monitoring mass concrete temperature gradient. Do not remove the temperature control mechanisms until the core temperature is within 50 degrees F of the ambient temperature. [Spec. 346-3, 346-7, 400-7]
15. Concrete shall not be placed until foundations, forms, falsework and rebars have been inspected and approved. [Spec. 400-7]
16. Placement concerns: placement in the final position and in level layers, no movement with a vibrator, no displacement of rebars, no aggregate segregation or separation, no lumps and balls with some exceptions and vibrations from adjacent equipment or operations must be controlled. [Spec. 346-6, 400-7]
17. Belt conveyors for concrete placement must be approved. [Spec. 400-7]
18. If concrete is pumped, the spec. requirements must be met. [Spec. 400-7]
19. Special requirements for placement in successive layers. [Spec. 400-7]
20. Number, type and size of vibrators must be approved and they shall be inserted and withdrawn as near to plumb as possible in a slow and steady manner. Circles of vibrator influence shall overlap to ensure that the entire placement is adequately vibrated. Proper vibration is particularly critical in areas where concrete flow is restricted by dense reinforcement or where concrete will not readily flow since these areas have a high probability of forming voids or honeycomb. [Spec. 400-7]
21. Columns shall be placed in one continuous operation unless construction joints are shown in the plans. [Spec. 400-7]
22. For slabs, screeding system must be demonstrated and approved prior to placement and concrete must be placed in continuous strips (transverse or longitudinal) with no time for initial set between strips except at planned joints. [Spec. 400-7 and Good Practice]
23. Unhardened concrete must be completely protected from rain and runoff by a system that does not come in contact with the concrete. [Spec. 400-7]

## ***CURING***

- 24. No further curing is required if forms are kept in place, without loosening, for at least 3 days but if before 3 days, an approved curing method must be used. [Spec. 400-16]
- 25. Proper application of an approved membrane curing compound at 1 gallon/150 square feet of surface area. [Spec. 400-16]
- 26. Covers for continuous moisture curing shall be kept continuously wet for at least 72 hours for other than decks; 7 days for decks. Burlap-polyethylene sheeting is required to have a minimum weight of 9 ounces/square yard. [Spec. 925-3, 400-16]
- 27. Curing compound for slip formed barrier walls must be applied at the proper spread rate within 30 minutes and must remain in place for at least 7 days [Spec. 400-16]
- 28. Construction joints have special curing. [Spec. 400-16]

## ***FORM REMOVAL***

- 29. Time of removal of forms shall be per plans, determined from compressive strength tests, developed from a time versus strength curve or as per specs. [Spec. 400-14]
- 30. Concrete in cofferdams must not be exposed to the action of water prior to final set and must not be exposed to salt or brackish water for 7 days after placement. [Spec. 400-7]

## ***FINAL FINSHING***

- 31. Remove form tie ends and irregular projections and patch void, honeycomb and form tie voids with mortar material and use methods that comply with specs. [Spec. 400-15]
- 32. Class V Coating (textured paint) must be on the QPL and meet material specs. and must have surfaces prepared and coatings applied in accordance with manufacturer's specs. at a spread rate of  $50 \pm 10 \text{ ft}^2/\text{gal}$ . Coating thickness shall be checked if the spread rate is uncertain. [Spec. 400-15, Good Practice]

## ***CRACK INSPECTION***

- 33. Inspect concrete surfaces as soon as surfaces are fully visible after casting, between 7 and 31 days after the component has been burdened with full dead load, and a minimum of 7 days after the bridge has been opened to full unrestricted traffic. [Spec. 400-21]

34. Measure the width, length, depth (coring may be needed), termination points and precise location of all cracks and display, to scale, the results on a drawing referred to as a crack map. After initial inspection determine the cause of the cracks, monitor the cracks and document the growth of individual cracks. Use a pocket microscope to measure crack widths of 25 mils or less. Determine if cracks are structural or nonstructural and determine the repair of nonstructural cracks in accordance with CPAM 10.3.5. [Spec. 400-21]
35. Inspect underwater components in accordance with CPAM 10.6. [CPAM 10.6]